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Express Mail No. EV324942639US

CLAIMS:

1. A method of controlling the critical dimensions of a photomask substrate, comprising:
 - providing a photomask substrate with a metal layer on top;
 - performing a photolithographic process on the photomask substrate;
 - measuring pre-etch critical dimensions of the printed pattern by an integrated measuring tool;
 - providing an initial etch recipe for a metal etch process;
 - modifying the etch recipe based on the pre-etch critical dimension data; and
 - performing the etch process on the photomask substrate based on the modified etch recipe.
2. The method of claim 1 further comprising;
 - measuring post-etch critical dimensions of the etched pattern; and
 - modifying the initial etch recipe for the next photomask substrate based on the post-etch critical dimensions data.
3. The method of claim 2 further comprising;
 - determining if the pre-etch critical dimensions are within specification;
 - if the pre-etch critical dimensions are within specification, sending the substrate to the next process step; and
 - if the pre-etch critical dimensions are out of specification, performing rework by removing photoresist from the substrate, and re-patterning the substrate with photoresist.
4. The method of claim 2 wherein the photomask is a binary photomask.
5. The method of claim 4 wherein the metal is chromium.
6. The method of claim 2 wherein the photomask is an attenuated photomask.
7. The method of claim 6 wherein the metal is molybdenum silicide.

PATENT

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8. The method of claim 2 wherein the photomask is an alternate photomask.
9. The method of claim 8 wherein the metal is chromium.
10. A method of monitoring the phase shift angle of a phase shift photomask, comprising:
 - providing a photomask substrate with an etched metal layer;
 - performing a photolithographic process on the photomask substrate;
 - etching the photomask substrate;
 - removing the remaining photoresist;
 - removing the remaining metal layer; and
 - measuring the phase shift angle and its uniformity across the substrate by an integrated measuring tool.
11. The method of claim 10 further comprising:
 - determining if the measured data of phase shift angle and its uniformity across the substrate are within specification;
 - if the measured data are within specification, the photomask process sequence is complete; and
 - if the measured data are out of specification, the photomask is marked out of specification.
12. The method of claim 10 wherein the phase shift mask is an alternate phase shift mask.
13. The method of claim 12 wherein the metal is chromium.
14. The method of claim 12 wherein the photomask substrate is quartz.
15. A method of monitoring the phase shift angle of a phase shift photomask, comprising:

PATENT

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providing a photomask substrate with a light-shielding metal layer on top of a translucent metal layer, which is deposited on the substrate;

performing a photolithographic process on the photomask substrate;

etching the light-shielding metal layer;

removing the remaining photoresist;

etching the translucent metal layer;

removing the light-shielding metal layer; and

measuring the phase shift angle and its uniformity across the substrate by an integrated measuring tool.

16. The method of claim 15 further comprising:

determining if the measured data of phase shift angle and its uniformity across the substrate are within specification;

if the measured data are within specification, considering the photomask process sequence is complete; and

if the measured data are out of specification, marking the photomask out of specification.

17. The method of claim 15 wherein the phase shift mask is an attenuated phase shift mask.

18. The method of claim 17 wherein the metal is molybdenum silicide.

19. An apparatus for controlling the critical dimensions of a photomask substrate, comprising:

a photomask etch chamber for processing a photomask substrate;

a measuring tool for measuring critical dimension information prior to and after processing by the process chamber; and

a computer system, coupled to the process chamber and the measurement tool, for storing the critical dimension information.

PATENT

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20. The apparatus of claim 19 wherein the measuring tool can operate under either reflective mode or transmission mode.
21. An apparatus for monitoring the phase shift angles of a phase shift photomask substrate, comprising:
- a process chamber for processing a substrate;
 - a measuring tool positioned for measuring phase shift angle and its uniformity across the substrate after the substrate is processed by the process chamber; and
 - a computer system, coupled to the process chamber and the measurement tool, for storing the measured information.
22. The apparatus of claim 21 wherein the process chamber is an etch chamber.
23. An apparatus for controlling the critical dimension and monitoring phase shift angles of a phase shift photomask substrate, comprising:
- a process chamber for processing a substrate;
 - a measuring tool positioned for measuring phase shift angle and its uniformity across the substrate after the substrate is processed by the process chamber;
 - a measuring tool positioned for measuring critical dimension information prior to and after processing by the process chamber; and
 - a computer system, coupled to the process chamber and the measurement tool, for storing the critical dimension information.
24. The apparatus of claim 23 wherein the process chamber is an etch chamber.
25. A method of controlling the critical dimension of the features of a photomask substrate, comprising:
- etching the features according to an etch recipe for specified critical dimensions of the features;

PATENT

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measuring the features to determine conformity with the specified critical dimensions;

determining from the measurement the modifications of the etch recipe required to conform to the specified critical dimensions; and

etching another photomask substrate according to the modified etch recipe.